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APPARATUS FOR MOVING FINGERS OR IMPLEMENTS ON PROSTHETIC LIMBS

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The invention pertains to an apparatus for moving fingers or implements on prosthetic limbs, wherein the movement of the finger or the like is done according to the invention by the rotation of a freely movable plate with one or more sloped planes that act on rods that can be displaced in the prosthetic limb fixed to the arm.

It has already been proposed for artificial hands to use a movable plate on a sleeve fitted to a stump; however, here there are no inclined surfaces on the plate that contact a rod as in the sense of the present invention. The known apparatuses have complicated constructions due to their behavior; in particular, special locking springs or levers are required in order to lock the artificial hand in the grasping position or to open it again.

On the contrary, the apparatus according to the present invention has an exceptionally simple design which operates completely without the use of wires, gears, special locking springs, levers, or the like.

An additional advantage of the apparatus according to the present invention is the following: one can produce the effective pressure for the rod oneself by very simple means even when the muscle action (the pronation rotation) acting on the rod is stopped, e.g., by arranging a recess or a bump at appropriate positions on the sloped plane. This enables the grasped object to be held by the thumb of the artificial hand of the invention, without requiring muscles to be strained during this time. The release of the thumb occurs at a given moment by supination motion (i.e., rotation in the opposite direction).

Finally, it should be mentioned that the rotatable disk with inclined surfaces according to the present invention is very suitable for rotating the muscle stump loops formed according to the Ceci-Sauerbruchschen operation method. Here, it is also possible that the self-actuating locking of the rods connected to the thumb has considerable importance because there is no need for a particular locking apparatus that requires additional, special forces for its release.

In the drawing, an embodiment of the object of the invention is shown; there is Figure 1, an overall view of the apparatus according to the invention, and Figure 2, a broken cross section of the artificial hand in enlarged scale.

As can be seen in Figure 1, the artificial hand 1 is connected to bars 2 with sleeves 3 for the forearm and the upper arm joined around the arm near the elbow joint such that the hand 1 does not follow the rotating motions of the arm stump 4. At the end of the forearm stump, a sleeve 5 is fixed that has a cross section corresponding to the arm stump and that supports a plate 6 with two inclined surfaces 7 and 8 sloping in different directions. Each of the inclined surfaces 7 and 8 works together with a rod 9 and 10, respectively. Each rod can move in the base of the artificial hand but cannot rotate about its own longitudinal axis. The ends of the rods are provided with rollers 14 and 15, respectively, that lie respectively against the inclined surfaces 7 and 8 and against the pressure surfaces 11, 12 of the fingers or implements to be moved (in the embodiment shown, of the thumb 13 to be moved). In the middle of the plate 6 supporting the inclined surfaces, a pin 16 is fixed that rotates in a bearing in the prosthetic limb and that is used for guiding the plate or the arm stump.

The method of operation of the apparatus is explained briefly as follows:

If the arm stump is in its normal position, the part (thumb 13) to be moved assumes its mid-position. The rollers 14, 15 of the rods 9 and 10 are always lying against the appropriate surfaces 7, 8 and 11, 12, respectively. If the arm stump now rotates clockwise, the rod 10 is pushed forward, the thumb 13 is moved forward due to the surface 12 and the rod 9 is moved backward due to the pressure surface 11, wherein the roller 14 of the rod 9 slides freely along the inclined surface 7. By rotating the arm stump in the opposite direction, the rod 9 is pushed forward by means of the closing of the thumb, wherein the rod 10 is moved backward by the pressure surface 12 without performing any work.

It should also be mentioned that the apparatus according to the invention can also be used if the arm must be amputated above the elbow joint, in which case the rotation movements of the upper arm stump are used for moving implements. In this case, the displacement of the rods arranged in the upper arm sleeve are transmitted by suitable means (e.g. Bowden wires) to the hand.

As desired, the inclined surfaces 7, 8 can be arranged elastically on the plate 6 so that a gentle opposing pressure between the individual parts is achieved and so that the risk of damaging the apparatus is reduced to a minimum.

In order to increase the motion possibilities of the parts of the prosthetic limb, flexible cords influenced by the shoulder blade can be used in combination with the apparatus according to the invention.

#### Claims

1. Apparatus for moving fingers or implements or similar parts on prosthetic limbs, characterized by a freely movable plate (6) with one or more sloped planes (7, 8) that act on rods (9, 10) that can be displaced in the prosthetic limb fixed to the arm.
2. Apparatus according to Claim 1, characterized in that the inclined surfaces (7, 8) are arranged elastically on the plate.
3. Apparatus according to Claims 1 and 2, characterized in that a pin (16) or the like is fixed in the middle of the plate supporting the inclined surfaces, wherein the pin rotates in a bearing in the base of the artificial hand and the pin is used for guiding the plate and the arm stump.

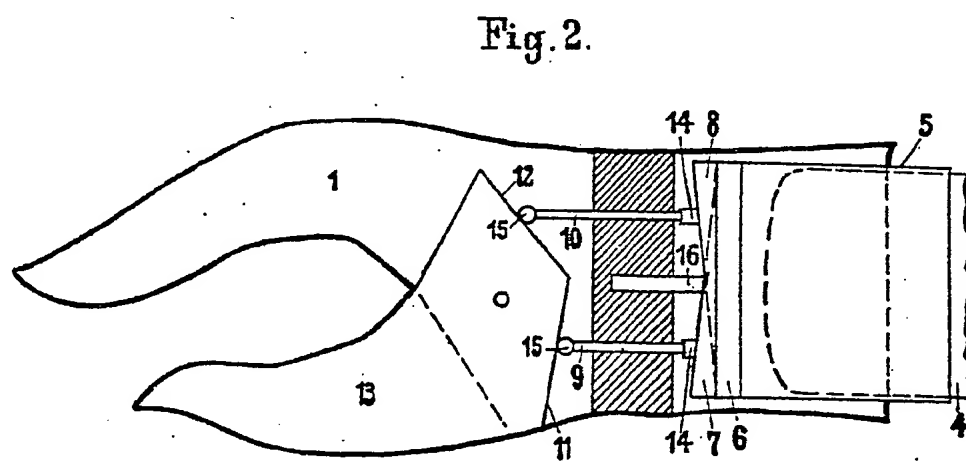
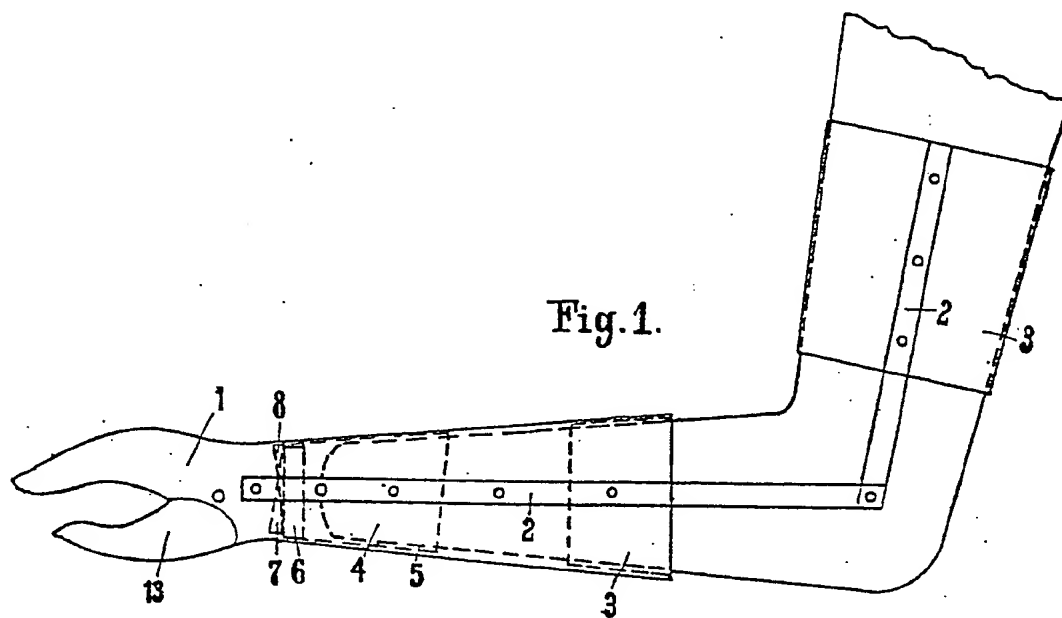


Fig. 1.

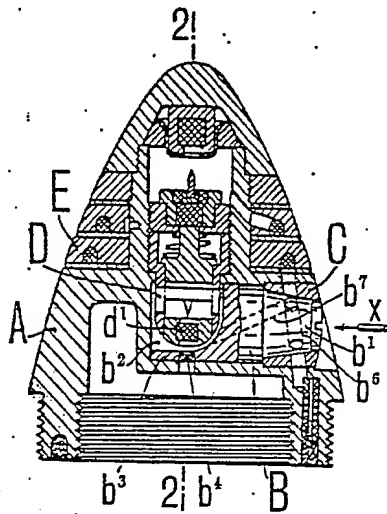


Fig. 2.

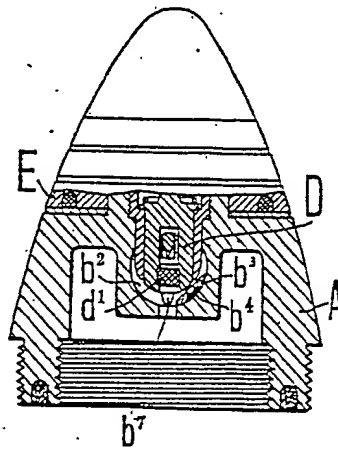


Fig. 3.

